UCRL-JC-121628 Abs

A comparison of nodular defect seed geometeries from different deposition techniques*

Christopher Stolz, Robert Tench, Mark Kozlowski
University of California
Lawrence Livermore National Laboratory
P. O. Box 808, L-463
Livermore, CA 94550

Anne Fornier
C.E.A.-Centre d'Etudes de Limeil-Valenton
94195 Villeneuve Saint Georges CÇdex
France

ABSTRACT

A Focused Ion Beam milling instrument, commonly utilized in the semiconductor industry for failure analysis and IC repair, is capable of cross sectioning nodular defects. Utilizing the instrument's scanning ion beam, high-resolution imaging of the exposed seeds that initiate nodular defect growth is possible. In an attempt to understand the origins of these seeds, HfO_2/SiO_2 and Ta_2O_5/SiO_2 coatings were prepared by a variety of vendors and different deposition processes including e-beam, DC magnetron sputtering, and ion beam sputtering.

By studying the shape, depth, and composition of the seed, inferences of it's origin can be drawn. Examination of boundaries between the nodule and thin film infer mechanical stability of the nodule. Significant differences in the seed composition, geometry of nodular growth and mechanical stability of the defects from sputtered versus e-beam coatings are reported. Differences in seed shape were also observed from different coating vendors using e-beam deposition of HfO_2/SiO_2 coatings.

*Work performed under the auspicies of the U. S. Department of Energy by Lawrence Livermore National Laboratory under Contract No. W-7405-ENG-48.